

Notice of Allowability

Application No.

09/941,125

Examiner

Arden B. Sperty

Applicant(s)

SANDHU ET AL.

Art Unit

1771

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Remarks filed 7/12/04, Terminal Disclaimer filed 08/04/04.
2. ☒ The allowed claim(s) is/are 51-56,60-73,75-78 and 81-85.
3. ☒ The drawings filed on 30 June 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).


* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS ("replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 07/12/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.


STEPHEN STEIN
PRIMARY EXAMINER

ALLOWANCE

1. Claims 51-56, 60-73, 75-78, and 81-85 are currently allowed subsequent to consideration of Remarks filed 07/12/04 and Terminal Disclaimer filed 08/04/04.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 07/12/04 was filed after the mailing date of the Final Action on 04/13/04. The submission is in compliance with the provisions of 37 CFR 1.97. The information disclosure statement has been considered by the examiner and the references are not found to anticipate the claimed invention.
3. While the 5401674 reference teaches a layer sequence (in order of uppermost to lowermost layer) Al (fill)/ TiN (barrier)/ TiGe (Ti alloy comprising Ti and Ge)/ TiSi (titanium silicide layer)/ Si (substrate), the structure is not taught as lining a high aspect ratio contact hole. It follows that the reference does not teach the Ti alloy layer as a continuous, uniform layer on the walls and base layer of a contact hole. Depositing the layer sequence of the reference in a high aspect ratio contact hole would not have been obvious to one of ordinary skill in the art, as the dimensions of such a hole present special challenges for deposition of a continuous, uniform layer on the sidewalls and base.
4. The 4782380 reference teaches a layer sequence of (from outermost to innermost) Al/ TiN/ Al (fill)/ TiN (barrier)/ TiSi (titanium silicide layer)/ Si (substrate). The layer sequence, as seen in the drawings as formed in a contact hole, fails to include a titanium alloy layer between the TiN and TiSi layers. Review of the prior art fails to teach

or fairly suggest a motivation for the inclusion of such a layer in the structure taught by the reference.

Reasons for Allowance

5. The following is an examiner's statement of reasons for allowance: The prior art of record is not seen to teach or fairly suggest the specific combination of claimed elements, including the particular layer sequence where a Ti alloy layer covers side walls and the base of a contact hole, the contact hole being of a high aspect ratio, and the particular sequence of layers comprising a TiN barrier layer/ Ti alloy layer/ TiSi layer wherein the alloy layer is especially a TiZn alloy.

6. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arden B. Sperty whose telephone number is (571)272-1543. The examiner can normally be reached on M-Th, 08:00-16:00.

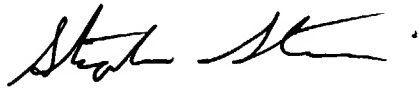
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571)272-1478. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1771

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Arden B. Sperty
Examiner
Art Unit 1771

August 13, 2004



STEPHEN STEIN
PRIMARY EXAMINER